**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| IN RE APPLICATION OF: Pabon et al. | § | DOCKET NO.: 26.0265 US |
| SERIAL NO.: 10/772,634 | § | GROUP ART UNIT: 2837 |
| FILED: February 5, 2004 | § | |
| TITLE: Acoustic Logging Tool Sleeve | § | EXAMINER: Jeremy Austin Luks |

**RESPONSE TO OFFICE ACTION**
**AND**
**STATEMENT OF THE SUBSTANCE OF TELEPHONIC INTERVIEW**
**ON 20 AUGUST 2007**

Honorable Commissioner of Patents
Alexandria, VA 22313-1450

Sir:

In response to the Office Action of 21 March 2007, please amend the above-identified application and enter the remarks as follows:

**Amendments to the Claims** are reflected in the listing of claims, which begins on page 2 of this paper.

**Remarks** begin on page 9 of this paper.

**This listing of claims will replace all prior version, and listings, of claims in the application:**

**Listing of Claims:**

1. (currently amended) A downhole acoustic tool apparatus comprising:

an acoustic source;

an acoustic receiver section; the acoustic receiver section comprising:

a central mandrel; and

an outer sleeve configured to isolate receiving elements and electronics of the acoustic receiver section from borehole environments, the outer sleeve having alternating zones of high and low acoustic impedance, the high and low acoustic impedance differing by at least a factor of two.

2. (original) The tool of claim 1, further comprising one or more acoustic receivers attached to the mandrel and housed by the outer sleeve.

3. (original) The tool of claim 1, further comprising oil disposed in an annulus between the central mandrel and the outer sleeve, the oil comprising an acoustic impedance matched to borehole fluid.

4. (original) The tool of claim 3, wherein the oil is pressurized to match a borehole environment.

5. (original) The tool of claim 1, wherein the alternating zones comprise bands having different acoustic impedance.

6. (original) The tool of claim 5, wherein the bands comprise separate, circumferentially continuous bands.

7. (original) The tool of claim 1, wherein the alternating zones comprise a plurality of circumferentially continuous, axially discontinuous bands.

8. (original) The tool of claim 1, wherein the high and low acoustic impedance differs by at least a factor of 5.

9. (original) The tool of claim 1, wherein the high and low acoustic impedance differs by at least a factor of 10.

10. (original) The tool of claim 2, wherein each low acoustic impedance zone is aligned axially with one or more of the acoustic receivers.

11. (original) The tool of claim 1, wherein each low acoustic impedance zone comprises an acoustic impedance substantially matching borehole fluid.

12. (original) The tool of claim 1, wherein an outer surface of the outer sleeve is acoustically smooth.

13. (original) The tool of claim 1, wherein the mandrel is hollow and defines a wiring conduit.

14. (previously presented) The tool of claim 1, further comprising a plurality of mass blocks attached about the mandrel, wherein one or more acoustic receivers are attached to the mass blocks.

15. (original) The tool of claim 1, wherein the mass blocks comprise an inner diameter bearing against an outer diameter of the mandrel in an interference fit.

16. (previously presented) The tool of claim 1, wherein the outer sleeve comprises a multiple modules, each module including:

a first hollow metallic cylinder,

a first supporting ring coaxial with and attached to the first hollow metallic cylinder;

a second supporting ring coaxial with and spaced axially from the first supporting ring; and

a second hollow cylinder comprising elastomer, resin, or both elastomer and resin disposed between the first and second supporting rings.

17. (withdrawn) The tool of claim 16, wherein the outer sleeve comprises a resin pipe with at least two metal rings attached thereto, the at least two metal rings being spaced from one another.

18. (withdrawn) The tool of claim 17, wherein the at least two metal rings are disposed in mating recesses along an internal surface of the resin pipe.

19. (withdrawn) The tool of claim 17, wherein the at least two metal rings are adhered to and protrude from an internal surface of the resin pipe.

20. (withdrawn) The tool of claim 16, wherein the outer sleeve comprises an elastomeric pipe with at least two metal rings attached thereto, the at least two metal rings being spaced from one another.

21. (original) The tool of claim 16, wherein the first and second cylinders are separable for maintenance and repair.

22. (currently amended) A sonic receiver sonde comprising:

a mandrel;

a plurality of spaced mass blocks attached to the mandrel;

a plurality of sonic receivers disposed in at least one of the plurality of spaced mass blocks; and

an outer sleeve covering the plurality of spaced mass blocks and sonic receivers to isolate the mass blocks and sonic receivers from borehole environments, the outer sleeve comprising first and second zones, the first zone comprising an acoustic impedance at least twice as high as the second zone.

23. (original) The sonic receiver sonde of claim 22, wherein the first zone comprises an acoustic impedance at least five times as high as the second zone.

24. (original) The sonic receiver sonde of claim 22, wherein the first zone comprises an acoustic impedance at least ten times as high as the second zone.

25. (original) The sonic receiver sonde of claim 22, wherein the second zone is substantially acoustically transparent.

26. (original) The sonic receiver sonde of claim 22, wherein the second zone is axially aligned with the plurality of sonic receivers.

27. (original) The sonic receiver sonde of claim 22, further comprising a plurality of alternating first and second zones.

28. (original) The sonic receiver sonde of claim 27, wherein the plurality of sonic receivers is disposed in at least two of the spaced mass blocks, and wherein each of the plurality of sonic receivers is axially aligned with one of the second zones.

29. (original) The sonic receiver sonde of claim 22, wherein the first and second zones comprise alternating circumferentially continuous bands.

30. (original) The sonic receiver sonde of claim 29, wherein the first zone comprises a metal band and the second zone comprises an elastomeric band.

31. (original) The sonic receiver sonde of claim 30, wherein the metal and elastomeric bands are separable for maintenance and replacement.

32. (original) The sonic receiver sonde of claim 28, wherein the first zone comprises a steel band and the second zone comprises a plastic band.

33. (original) The sonic receiver sonde of claim 30, wherein an outer surface of the outer sleeve is acoustically smooth relative to a wavelength of sonic signals received by the sonic receivers.

34. (original) The sonic receiver sonde of claim 22, wherein the outer sleeve comprises a plurality of sleeve modules.

35. (original) The sonic receiver sonde of claim 34, wherein each of the sleeve modules comprises:

a first hollow metallic cylinder;

a second hollow cylinder comprising elastomer, resin, or both elastomer and resin; and

first and second supporting rings.

36. (withdrawn) The sonic receiver sonde of claim 22, wherein the outer sleeve comprises a resin pipe with at least two metal rings attached thereto, the at least two metal rings being spaced from one another.

37. (currently amended) A sonic receiver sleeve comprising:

a first hollow metallic cylinder,

a first supporting ring coaxial with and attached to the first hollow metallic cylinder;

a second supporting ring coaxial with and spaced axially from the first supporting ring; and

a second hollow cylinder sandwiched between the first and second supporting rings, and comprising an acoustic impedance matched to an acoustic impedance of a borehole fluid,

wherein the sonic receiver sleeve is configured to encase sonic receivers of a sonic logging tool to isolate the sonic receivers from borehole environments.

38. (currently amended) The sonic receiver sleeve of claim ~~3837~~, further comprising:

a third hollow metallic cylinder attached to the second supporting ring opposite of the second hollow cylinder;

a third supporting ring coaxial with and attached to the third hollow metallic cylinder;

a fourth supporting ring coaxial with and spaced axially from the third supporting ring; and

a fourth hollow cylinder comprising elastomer, resin, or both elastomer and resin disposed between the third and fourth supporting rings.

39. (currently amended) The sonic receiver sleeve of claim 38, wherein the second and fourth hollow cylinders are aligned with the sonic receivers of the ~~a~~ sonic logging tool.

40. (original) The sonic receiver sleeve of claim 38, wherein the first and third hollow metallic cylinders each comprise an acoustic impedance at least twice as high as the second and fourth hollow cylinders.

41. (original) The sonic receiver sleeve of claim 38, wherein the first and third hollow metallic cylinders each comprise an acoustic impedance at least ten times as high as the second and fourth hollow cylinders.

42. (currently amended) An acoustic receiver sonde comprising:

a central rigid mandrel;

a plurality of spaced receiver blocks rigidly attached to the mandrel;

a plurality of acoustic receivers attached to each of the plurality of spaced receiver blocks; and

a plurality of axially discontinuous, circumferentially continuous acoustic impedance zones ~~covering~~encasing the plurality of spaced receiver blocks and acoustic receivers to isolate the receiver blocks and acoustic receivers from borehole environments.

43. (original) The acoustic receiver sonde of claim 42, wherein alternating zones differ in acoustic impedance by at least a factor of two.

44. (original) The acoustic receiver sonde of claim 42, wherein alternating zones differ in acoustic impedance by at least a factor of five.

45. (original) The acoustic receiver sonde of claim 42, wherein alternating zones comprise steel and elastomeric rings.

46. (original) The acoustic receiver sonde of claim 42, wherein alternating zones comprise steel and resin rings.

47. (previously presented) The sonic receiver sleeve of claim 37, wherein the second hollow cylinder comprises elastomer, resin, or both elastomer and resin.

## REMARKS

Claims 1-47 are pending in the application. Claims 17-20 and 36 are withdrawn from further consideration by the Examiner pursuant to a restriction requirement under 35 U.S.C. §121. Responsive to the Office Action dated 21 March 2007, applicants have amended the independent claims 1, 22, 37 and 42, and dependent claims 38 and 39 (shown in the Listing of Claims attached hereto) in order to more particularly and completely claim the present invention. No new matter has been introduced. Applicants respectfully request reconsideration of the application in view of the foregoing amendment and following remarks.

**Substance of Telephonic Interview on 20 August 2007**

Applicants provide a statement of the substance of the telephonic interview with the Examiner on August 20, 2007 as follows:

Applicants' undersigned attorney thanks the Examiner for the courtesies extended during the telephone interview on August 20, 2007. No exhibits were shown or any demonstrations conducted. The independent claims were discussed, and claim language was proposed to clarify the differences of the present invention over the Arian et al. and Meehan references.

The principal arguments presented to the Examiner are presented in detail below.

**Claim Rejections – 35 U.S.C. §103(a)**

Claims 1-16, 21-35, and 37-47 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Arian et al. (US 6,564,899) in view of Hoyle et al. (US 5,036,945), Meehan (US Pub. No. 2002/0080682) and Chung et al. (US Re.33,837). Reconsideration is requested.

Claim 1 has been amended to specify:

"an outer sleeve configured to isolate receiving elements and electronics of the acoustic receiver section from borehole environments."

Similar claim language has been added to the other independent claims. Support for the claim amendments may be found on page 11, paragraph 48, of the present specification.

The prior art of record does not disclose or suggest the combinations of features in independent claims 1, 22, 37, and 42.

In the Office Action, the Examiner appears to have rejected independent claims 1 and 22 for the following reasons:

(1) Meehan teaches alternating zones of high and low impedance bands wherein the first and third hollow metallic cylinders each comprise an acoustic impedance between twice and at least ten times as high as the second and fourth hollow cylinders when in combination. See last sentence on page 4 carrying over to page 5 of the Office Action.

(2) It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the first and third hollow metallic cylinders each with an acoustic impedance between twice and at least ten times as high as the second and fourth hollow cylinders on the grounds that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working range involves only routine skill in the art. See second sentence on page 5.

However, the Examiner has not shown where there is motivation to combine Meehan with the other cited references, especially Arian. Moreover, the Examiner has not shown where Meehan discloses or suggests providing differences in acoustic impedance that range from a factor of two to a factor of ten, as claimed in the instant claims.

Moreover, the Examiner fails to note that Arian in fact teaches away from the instant claim features, viz., acoustic impedance differs by "at least a factor of two" (in claim 1) and is "at least twice as high as the second zone" (in claim 22). In this, Arian teaches that the acoustic impedance of the absorbing rings should be closer in value to the acoustic impedance of the tool body so that transfer of acoustic energy from the tool body to the acoustic absorbing rings can be enhanced. See col. 9, lines 28-33. In other words, Arian teaches away from the instant claimed invention, which is directed to differing acoustic impedance between zones.

In contrast, Meehan has a generalized teaching of sections having different impedance (see page 3, paragraph 48), but does not provide any teaching as to the specific differences in impedance. Therefore, the combination of Arian and Meehan proposed by the Examiner is untenable.

The Examiner appears to have rejected independent claim 42 on the grounds that "rearranging parts of an invention involves only routine skill in the art." Office Action at page 3. It appears that the Examiner considers Arian as disclosing acoustic impedance zones that cover a plurality of spaced receiver blocks and acoustic receivers, as specified in instant claim 42. As mentioned above, similar claim language has been added to the other independent claims.

Arian does not teach acoustic impedance zones that cover receiver blocks and acoustic receivers to isolate them from borehole environments. It is noted that in Arian, the receivers are exposed to pressure in the borehole. See Arian at col. 13, lines 14-15.

The mere fact that a person skilled in the art could rearrange the parts of a reference device to meet the terms of the claim is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of the instant specification, to make the necessary changes in the reference device. *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).

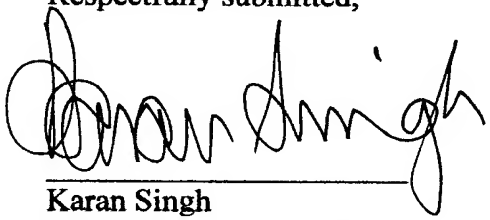
For the reasons discussed above, independent claims 1, 22, 37 and 42 should be allowable. Claims 2-21, 23-36, 38-41, and 43-47, which depend from corresponding independent claims, should be allowable for at least the same reasons.

**Conclusion**

In light of the above amendments and remarks, applicants believe that the present application and claims 1-47 are in proper condition for allowance. Such allowance is earnestly requested.

In the event that any additional fees or credits are due owing to this response, the Commissioner is hereby authorized to charge the amount necessary to cover any fee that may be due or to credit any overpayment to Deposit Account 50-1122.

Respectfully submitted,



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